Claims

1. An inductor assembly for induction heat treatment of a workpiece, the inductor assembly comprising:

an inductor formed from a single piece of an electrically conductive stock, the inductor having a workpiece opening passing through the width of the inductor, into which the workpiece can be inserted, and a pair of legs for connecting the inductor to a source of ac power, the legs electrically separated from each other by a leg slot to form an integral single-turn coil around the workpiece opening;

a flux concentrator disposed at least partially around the workpiece on at least one of the two opposing sides of the inductor; and

a top, side and bottom frame member formed from an electrically non-conductive material and joined together to at least partially surround the top edge of the inductor, the side edge of the inductor opposing the pair of legs, and the bottom edge of the inductor, to hold the flux concentrators in place.

2. The inductor assembly of claim 1 further comprising:

a quench slot in the inductor, the quench slot forming an interior passage in the inductor from at least the top, side or bottom edge of the inductor to at least partially around the workpiece opening;

a quench chamber in at least the top, side or bottom frame member, the quench chamber connected to the quench slot in the inductor; and

a means for connecting the quench chamber to a source of a quench medium.

3. An inductor assembly for induction heat treatment of a workpiece, the inductor assembly comprising:

an inductor formed from a single piece of an electrically conductive stock, the inductor having a workpiece opening passing through the width of the inductor, into which the workpiece can be inserted, and a pair of legs for connecting the inductor to a source of ac power, the legs electrically separated from each other by a leg slot to form an integral single-turn coil around the workpiece opening;

a flux concentrator disposed at least partially around the workpiece opening on at least one of the two opposing sides of the inductor;

a top and a bottom frame formed from an electrically non-conductive material, the top and bottom frame each having a U-shaped groove along a longitudinal side into which the top edges of the inductor and the flux concentrator seat into the top frame, and the bottom edges

of the inductor and the flux concentrator seat into the bottom frame;

a side frame formed from an electrically non-conductive material, the side frame having a U-shaped groove along a longitudinal side into which the side edges of the inductor and the flux concentrator seat, the ends of the side frame having a tongue for seating in the U-shaped grooves of the top and bottom frames;

a means for fastening the top, side and bottom frames together to form a C-shaped frame around the top, side and bottom edges of the inductor, respectively, to hold the flux concentrator in place; and

a means for fastening the top and bottom frames to the inductor.

4. The inductor assembly of claim 3 wherein the means for fastening the top, side and bottom frames together comprises fasteners inserted into through holes in the top and bottom frames and holes in the ends of the side frame.

5. The inductor assembly of claim 3 wherein the means for fastening the top and bottom frames to the inductor comprises fasteners inserted into through holes in the top and bottom frames and holes in the inductor.

6. The inductor assembly of claim 3 wherein the means for fastening the top, side and bottom frames together comprises fasteners inserted into through holes in the top and bottom frames and holes in the ends of the side frame, and the means for fastening the top and bottom frames to the inductor comprises fasteners inserted into through holes in the top and bottom frames and holes in the inductor

7. The inductor assembly of claim 3 further comprising:

a quench slot in the inductor, the quench slot forming an interior passage in the inductor from at least the top, side or bottom edge of the inductor to at least partially around the workpiece opening;

a quench chamber in at least in the top, side or bottom frame member, the quench chamber connected to the quench slot in the inductor; and

a means for connecting the quench chamber to a source of a quench medium.

8. A method of induction heat treating a workpiece comprising the steps:

fabricating a continuous, single-turn, inductor from a single piece of an electrically conductive stock by forming a workpiece opening through the width of the stock and forming a pair of legs in the stock by forming a leg slot in the stock to separate the pair of legs;

connecting the pair of legs to the output of an ac power supply;

placing a flux concentrator on at least one face of the two opposing faces of the

inductor;

holding the flux concentrator in place by fastening an electrically non-conductive top, side and bottom frame member around the top edge of the inductor, the side edge of the inductor opposing the pair of legs, and the bottom edge of the inductor, respectively; and

inserting the workpiece in the workpiece opening.

9. The method of claim 8 further comprising the steps of:

forming an interior quench slot from at least the top, side or bottom edge of the inductor to at least partially around the workpiece opening;

forming a quench chamber in at least the top, side or bottom frame member, the quench chamber connected to the interior quench slot;

connecting the quench chamber to a source of a quench medium; and

supplying the quench medium to quench the workpiece via the quench chamber and interior quench slot.